

Hypoglycemia-Triggered Motion Artifact on ^{68}Ga -DOTA-TOC Positron Emission Tomography/Computed Tomography

Sir,

Patient motion-related artifacts in positron emission tomography/computed tomography (PET/CT) are usually related to breathing and are frequent cause of image misinterpretation/quantification errors. Here, we report an unusual instance of hypoglycemia-triggered motion artifact noted on Ga-68 DOTA-TOC PET/CT images of a patient suspected to have multiple endocrine neoplasia Type 1 (MEN1) syndrome.

The case is 58-year-old male, a known case of MEN1 syndrome on alternative/native treatment for 7 years admitted to our hospital with complaints of weight loss, diarrhea, visual disturbance, and recurrent hypoglycemic episodes. Biochemical evidence was suggestive of gastrinoma (serum gastrin – 7163 pg/ml, chromogranin A – 10,501.2 ng/l), pituitary adenoma (prolactin – 492.8 ng/ml), and hyperparathyroidism (serum parathyroid hormone – 266 pg/ml, serum calcium – 12.2 mg/dl). Due to recurrent hypoglycemic episodes, patient's blood sugar was evaluated which showed low fasting (40 mg/dl) and more pronounced low postprandial blood sugar (<40 mg/dl). However, his fasting insulin levels were noted to be normal which ruled out insulinoma. ^{68}Ga -DOTA-TOC PET/CT scan was done for baseline disease status evaluation and metastatic workup. Maximum intensity projection image [Figure 1a, black arrow] and transaxial fused PET/CT image [Figure 1b] showed 2 focal hotspots in the brain

on either side of pituitary fossa. CT of the base of skull was unremarkable for any lesion in the cavernous sinus region and showed a 1.6 cm isodense soft tissue lesion in pituitary fossa [Figure 1c – white arrow head]. This PET-CT misregistration most likely occurred due to patient motion noticed during the end of scan. Postscan acquisition examination of the patient revealed acute confusion and inability to recognize place/person. Hypoglycemia-induced delirium was confirmed with a capillary blood glucose test which was noted to be 27 mg/dl. Repeat PET/CT scan of the brain was acquired after prompt correction of glucose with intravenous 5% dextrose infusion over 20 min. Scan revealed a DOTA-TOC avid 1.6 cm soft tissue lesion (SUVmax-23.8) in the pituitary fossa consistent with clinical diagnosis of pituitary adenoma [Figure 1d, fused transaxial PET/CT image of caudal brain]. Apart from the pituitary lesion, whole-body survey revealed a DOTA-TOC avid 1.3 cm polypoidal lesion in the pylorus of the stomach [Figure 1e, small white arrow, SUVmax-24] and DOTA-TOC avid 3.4 cm necrotic mass in the head of the pancreas [Figure 1f, long white arrow, SUVmax 74.28] consistent with clinical diagnosis of gastrinoma.

Multiple endocrine neoplasia Type 1 (MEN1) is a rare autosomal dominant hereditary tumor syndrome caused by inactivating mutations of the tumor suppressor gene *MEN1* and characterized by a predisposition to a multiple endocrine (parathyroid, entero-pancreatic, and pituitary)

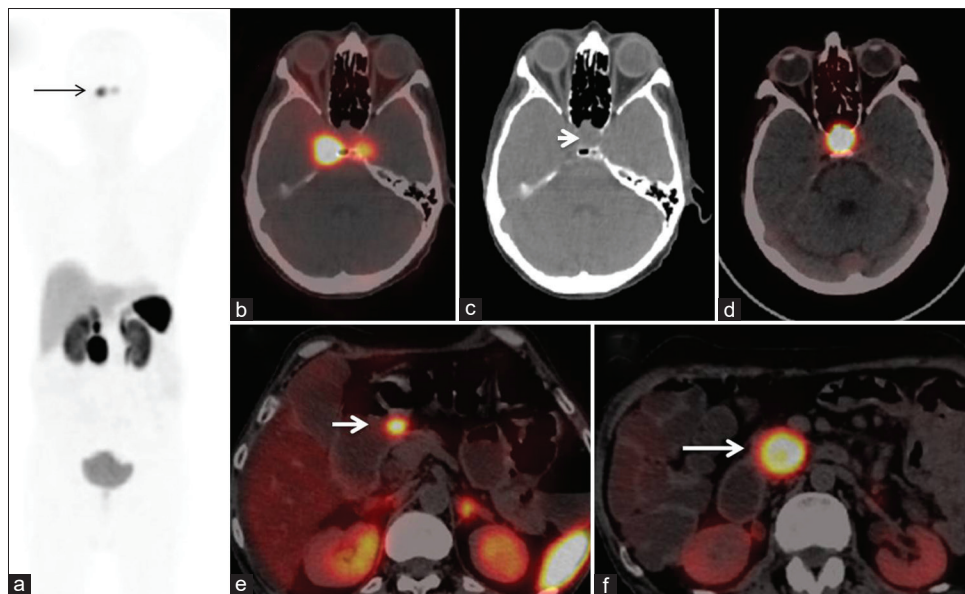


Figure 1: Maximum intensity projection image (black arrow, a) showing 2 focal uptake on either side of brain on either side of mid line, seen as uptake in bilateral cavernous sinus region on trans-axial FDG PET/CT image (b) with no significant corresponding abnormality but only a solitary pituitary lesion on trans-axial CT (c). Repeated PET/CT acquired after correction of blood glucose shows single uptake co-registered with pituitary lesion on fused PET/CT image (d). Additionally DOTA-TOC avid lesion noted in distal stomach and head of pancreas on fused PET/CT image of mid-abdomen (white arrows, e and f) respectively- suggestive of Gastrinoma

and nonendocrine tumors (foregut carcinoid tumors, adrenocortical tumors, meningiomas, angiofibromas, and collagenomas). Gastrinoma is the most common functional entero-pancreatic tumor in MEN1 which occurs primarily in duodenum and less frequently in pancreas. Refractory recurrent peptic ulcerations with or without diarrhea are common clinical presentations in these patients.^[1] Rarely, repeated hypoglycemic episodes have been reported in the patients with gastrinoma. High gastrin levels are believed to cause increased gastric emptying with subsequent increased acid and glucose transit into duodenum. This increased enteric delivery of glucose probably then triggers an inappropriate/exaggerated insulin response causing recurrent postprandial hypoglycemia.^[2,3]

Owing to its higher accurate diagnostic accuracy compared to conventional imaging, ⁶⁸Ga-DOTA-TOC PET/CT is increasingly being used in disease management of patients with MEN1.^[4,5] Patient-related motion artifacts, although infrequent, are an important cause of image misinterpretation in hybrid imaging technologies such as PET/CT or PET/MR which have long scan acquisition time.^[6,7] These artifacts should be suspected, especially in instances of discordance between clinical and imaging findings. More importantly, the nuclear medicine physician should be vigilant, promptly recognize and treat the life-threatening clinical events which may be responsible for triggering patient motion during scan acquisition.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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